WHAT IS CLAIMED IS:

1. A multi-layer random access memory, comprising:

a first conductive trace for generating a first magnetic field in response to a current applied to the first conductive trace;

a second conductive trace for generating a second magnetic field in response to a current applied to the second conductive trace;

a third conductive trace for generating a third magnetic field in response to a current applied to the third conductive trace;

a first magnetic storage element operatively positioned between the first and second conductive traces, wherein the first magnetic storage element is adapted to store a bit of data as an orientation of magnetization and rotate the orientation of magnetization in response to the first and second magnetic fields; and

a second magnetic storage element operatively positioned between the second and third conductive traces, wherein the second magnetic storage element is adapted to store a bit of data as an orientation of magnetization and rotate the orientation of magnetization in response to the second and third magnetic fields.

2. The multi-layer random access memory of claim 1, further comprising:

a fourth conductive trace for generating a fourth magnetic field in response to a current applied to the fourth conductive trace; and

a third magnetic storage element operatively positioned between the third and fourth conductive traces, wherein the third magnetic storage element is adapted to store a bit of data as an orientation of magnetization and rotate the orientation of magnetization in response to the third and fourth magnetic fields.

3. The multi-layer random access memory of claim 1, wherein the first and second magnetic storage elements each comprise a storage layer having an easy axis.

4. The multi-layer random access memory of claim 3, wherein the first magnetic field is substantially parallel with the easy axis of the first magnetic storage element.

5. The multi-layer random access memory of claim 3, wherein the second magnetic field is substantially perpendicular to the easy axis of the first and second magnetic storage elements.

6. The multi-layer random access memory of claim 3, wherein the third magnetic field is substantially parallel to the easy axis of the second magnetic storage element.

7. The multi-layer random access memory of claim 1, wherein the first and second magnetic storage elements are spin tunneling devices.

8. The multi-layer random access memory of claim 1, wherein the first and second magnetic storage elements are giant magneto-resistive devices.

9. The multi-layer random access memory of claim 1, wherein alternate conductive traces are generally perpendicular to each other.

10. A multi-layer random access memory, comprising:

N+1 stacked conductive traces for generating N+1 magnetic fields in response to a current applied to each conductive trace; and

N stacked magnetic storage elements, wherein each one of the N magnetic storage elements is operatively positioned between a different adjacent pair of the N+1 stacked conductive traces, and wherein each magnetic storage element is adapted to store a bit of data as an orientation of magnetization and rotate the orientation of magnetization in response to the magnetic fields of the adjacent pair of conductive traces;

where N is greater than 1.

11. The multi-layer random access memory of claim 10, wherein the magnetic storage elements each comprise a storage layer having an easy axis.

12. The multi-layer random access memory of claim 11, wherein the magnetic field of one conductor of each adjacent pair of conductive traces is substantially parallel with the easy axis of the magnetic storage element positioned between the adjacent pair of conductive traces.

13. The multi-layer random access memory of claim 11, wherein the magnetic field of one conductor of each adjacent pair of conductive traces is substantially perpendicular with the easy axis of the magnetic storage element positioned between the adjacent pair of conductive traces.

14. The multi-layer random access memory of claim 10, wherein the magnetic storage elements are spin tunneling devices.

15. The multi-layer random access memory of claim 10, wherein the magnetic storage elements are giant magneto-resistive devices.

16. The multi-layer random access memory of claim 10, wherein alternate conductive traces are generally perpendicular to each other.